

**Red Rock Canyon National Conservation Area
Environmental Education Program**

Mojave Max Emergence

www.Mojavemax.com

Classroom Program

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8/21/03

Grade	Sixth
Subject	Desert Tortoise
Theme	Mojave Max is a member of a threatened species well adapted to the desert life by various methods including brumation.
Goal	Expose students to the desert tortoise, its ecosystem and biomes, and how a student's actions affect its existence.
Objective	<p>Students will observe how climate and seasons affect the desert tortoise.</p> <p>Students will identify at least two adaptations of the desert tortoise that enable the reptile to survive in desert conditions.</p> <p>Students will understand the relationship of the desert tortoise in the food chain.</p> <p>Students will compare human physiology to animal physiology.</p> <p>Students will recognize the threats to the ecosystem of the desert tortoise.</p> <p>Students will identify at least one way they can help protect the desert tortoise.</p>

Curriculum

See **Attachment A** broken out by grade level

Vocabulary

- Adaptation – a physical or behavioral feature or trait of an animal or plant that helps it survive in its environment.
- Aestivation – a lethargic sleep-state of inactivity that some animals enter to escape the summer seasonal heat.

- Biome – Environment that has a characteristic collection of plants and animals.
- Brumation – term used for reptiles that enter a winter dormancy or torpid state to escape the cold of winter.
- Burrow - a hole in the ground made by an animal.
- Habitat – a place where a plant or an animal lives in nature
- Hibernation – a deep sleep that some birds and mammals enter to escape the cold of winter.
- Hyperthermia – A rising of the body's core temperature to a level where normal brain and/or muscle function is impaired.
- Hyponatremia – a low sodium level in the blood usually caused by salt loss in sweat exceeding salt intake; and water intake exceeding water loss. Also considered “water drunk.”
- Hypothermia – A lowering of the body's core temperature to a level where normal brain and /or muscle function is impaired.
- Predator – an animal that hunts and eats another animal.
- Prey – an animal that is hunted and eaten by another animal.
- Reptile – an animal with a backbone that is cold-blooded (ectothermic) and can not regulate its body temperature internally. It is dependent on the environment around it. It has dry skin covered with scutes or scales and breaths by a set of lungs.
- Scute- external, horny plates overlaying the bony covering found on the carapace (back) and plastron (underside) of the desert tortoise shell.
- Weed – a non-native plant.

Background

The growth of the Las Vegas Valley over the past few years has caused increased development, more road construction, off-road vehicle travel, and the dumping of trash in our fragile desert environment. Humans are largely responsible for the loss and degradation of desert tortoise habitat in the Mojave Desert and why the tortoise is now under federal protection. The introduction of non-native plants has also impacted the habit of the desert tortoise. It is important to manage these protected lands and realize how each person's actions impact the desert tortoise. Red Rock Canyon, an area west of the valley, is home to Mojave Max, an approximately 40 year-old male tortoise, who is the representative for all threatened desert tortoises who live in the Mojave Desert.

Red Rock Canyon/*Federal Agency Conservation Message*

Red Rock Canyon National Conservation Area represents some of the best geologic features, and unique plants and animals found in the Mojave Desert. The area provides scenic and recreational opportunities for hundreds of people each day, and is a safe haven for wild plants and animals of the Mojave Desert. It is protected by legislation passed in 1970 that set this 200,000-acre habitat aside as a natural setting for present and future generations to enjoy. The actions taken today by people who frequent this conservation area affect not only the plants and animals that live here but also future visitors to southern Nevada.

Federal Agencies/Clark County

Clark County has partnered with the United States Fish and Wildlife Service, Bureau of Land Management, National Park Service, and the U.S. Forest Service, the federal agencies who manage the natural habitat that surrounds the Las Vegas Valley, to bring a desert tortoise program to teachers and students throughout the district. The Multiple Species Habitat Conservation Plan and its Public Information Education committee sponsor the Mojave Max Emergence Contest and continuing education classes in the local schools.

Background on Mojave Desert Biome

The Mojave Desert is among the hottest and driest deserts in North America. Temperatures range from over 120 degrees in the summer to below freezing in the winter. The average yearly rainfall measures only four to six inches and almost all of it is during the winter. At Red Rock Canyon, precipitation is close to 10 inches due to the snowfall in the winter months.

The drying effects of the wind and the intense sunlight also contribute to the desert conditions.

The Mojave Desert is known as a **Rain Shadow Desert**. The Sierra Nevada Mountain Range separates the Mojave Desert from the coastal lands of California. When moisture filled clouds develop off the coast of California and blow ashore, they travel across the state and encounter this massive mountain range, as well as a number of smaller ranges stretching across Eastern California. As the clouds begin to gain elevation the air then cools, the water condenses, and the clouds drop their moisture in the form of rain or snow depending on the season. By the time these clouds have moved inland to the Las Vegas Valley there is little moisture left in the air to distribute over Southern Nevada. We are in the shadow of the rain.

Desert Tortoise – General Background

Tortoises are a type of reptile. Other reptiles include lizards and snakes. Reptiles have scaly skin, most lay eggs, and are cold blooded. Cold-blooded, or ectothermic (exto = “outside”, thermic = “heat”), animals depend on heat from outside their bodies (unlike mammals and birds that generate their own heat), so they must rely on an external energy source (the sun) to keep them warm to survive. When you see a reptile basking in the sun they are not trying to get a suntan but warming their bodies. The tortoise is most “comfortable” when its body temperature is between approximately 85 degrees and 95 degrees.

Is a tortoise a turtle? Yes, but not all turtles are tortoises. When we think of turtles, the first thing that comes to mind is a turtle spending its time sun bathing next to a pond. But, there aren’t many ponds in the desert and the tortoise doesn’t know how to swim. The tortoise is a land dwelling turtle, and only goes to the water to drink. The desert tortoise is not green like so many cartoons depict turtles, but vary in colors ranging from light tan to yellow-brown to blackish – all of which can blend in to the desert environment.

Tortoises can live to be nearly 60 years old in the wild and more than 80 in captivity.

Adaptations

The Desert Tortoise has made the Mojave Desert its home for thousands of years. How is a desert tortoise able to survive such harsh conditions? This animal has developed physical and behavioral traits that enable it to occupy the desert in numerous ways some of which are:

- hard shells, strong nails and powerful front legs that allow them to dig underground burrows.
- brumation in the winter months
- aestivating in the extreme heat of the summer season
- conserving water over long periods of time by retention in its bladder,

Physical Traits

Its legs with their strong ligaments on the forelegs give the tortoise the advantage when digging burrows (to escape the above ground temperature), which are critical to the reptiles’ survival. The forearms are scaly, muscular and flattened with thick, long toenails acting as tiny shovels for digging. The

scales help reduce injury. Strong hind legs with their long nails facilitate the tortoise in digging nests in the dry, sandy soil.

All tortoises have shells. The desert tortoise has a characteristic dome-shaped shell that ranges in color from yellowish-brown to brownish-gray to nearly black. The shell has three basic parts: the plastron on the underside, the carapace covering the back with 13 large scutes arranged in a pattern on the top of the carapace, and the bony bridges that connect the plastron and carapace. Smaller scutes rim the perimeter of the carapace.

Both the male and female have a gular horn located on the front of the plastron. The horn is longer in the male and often upturned. Males use these in fighting with other males throughout the year and many times can flip the other male on its back. The opponent attempts to stand as high as possible to prevent this from happening.

Burrows

Tortoises dig numerous burrows - some are shallow and some extend more than 10 feet. The incline may vary anywhere between 4 and 40 degrees. Tortoises also live on the rocky slopes of hills and mountains. They will dig their burrows under large boulders and outcrops in contact with the soil.

Temperature regulation is the main function of a burrow. Although temperatures range greatly within the burrow throughout the year it still acts as a temperature buffer against the extreme above ground temperatures overhead. In summer the protection provided by being under the surface prevents continued heating of the body to lethal temperatures. Tortoises use burrows to prevent freezing during the dormant season as well.

The tortoise can have a dozen or more burrows scattered throughout its home range. It can easily escape the heat of the day by finding and entering these burrows.

Seasonal Behavioral Traits

Brumation

In the fall temperatures begin to drop in the Mojave Desert. One way to escape the cool temperatures and to survive the winter with little or no food is to brumate. The desert tortoise typically enters long underground burrows many of which have a characteristic half-moon shape entrance and can be more than 10 feet long. The burrow channel can conform to the shape and girth of the tortoise and may not even allow the tortoise to turn around

except after reaching the end. This snugness is efficient for temperature regulation and helps maintain a slightly higher humidity in the burrow. During the dormant time, several tortoises may occupy the same burrow.

While brumating the tortoise is in a period of inactivity. The body slowly loses heat and stabilizes to the air temperature found in the burrow, about 40-60 degrees Fahrenheit. All body processes are slowed including the heart rate and respiration rate. Tortoises are not “asleep” like in the sense of an antelope ground squirrel, which hibernates, but their body metabolism does slow and they’re just waiting for warm weather again.

Hibernation

A more familiar term is hibernation. Mammals such as antelope ground squirrels enter into a deep sleep to escape the cold of winter. Body temperatures drop and the metabolic rate is about 2% to 5% of the rate of a normal body temperature. The hibernators survive on their body reserves through a long cold winter. They are not easily awakened in this state.

Aestivation

Burrows also provide protection from the intense heat of the desert. The ground in the Mojave Desert can reach up to 140 degrees and since the tortoise cannot control its internal temperature it must find ways to keep from overheating. A tortoise might only be active above ground in the early morning (dawn) and late afternoon or evening (dusk). The rest of the day a tortoise will retreat to the burrow. During aestivation, the tortoise is underground during the hottest and driest part of the season. They may squeak or be aroused by touch when aestivating and their respiratory movements are more apparent than while brumating. Preventing death from overheating is at the root of much of tortoise behavior.

Emergence

It is impossible to predict exactly when the tortoise will come out of its burrow in the spring. There are three factors that tell the tortoise to emerge. The outside temperature is the first factor. Since tortoises are reptiles, they respond quite quickly to temperature change. As winter retreats, the sun's rays become more direct, the ground begins to heat gradually and eventually the warmth reaches the depth of the burrow. As the weather gets warmer so do their bodies, allowing them to begin to move. When the above ground temperatures permit the tortoise to move, some will walk out of their burrows. The amount of daylight each day is another factor. As spring

approaches each day gets longer. The third, and most important factor is the tortoise's internal clock. It seems that sometimes tortoises have an unexplained behavior or "instinct", regardless of the temperature or amount of daylight to just emerge one day.

Hatchling

Baby tortoises – also known as hatchlings - hatch from eggs in late summer, approximately 80-120 days after being laid in early spring. They are less than two inches long and very vulnerable because the shell, pliable for the first five years of life, has very little bone formed under the scutes as yet. Approximately one out of every 100 born reaches maturity. Maturity does not occur until around age 15 or older in the wild. Once the tortoise emerges from the shell they are independent and live solitary lives except during mating season.

Needs

Water Conservation

Tortoises can go long periods of time without taking in water. A tortoise's bladder is capable of storing over a cup of water, to be reabsorbed by the body as needed. They typically void only when they are drinking – replenishing their water supply.

Much of the water intake comes from moisture in the grasses and wildflowers they consume in the spring. Tortoises will also drink from rain puddles, even constructing their own puddles by scraping shallow depressions in the soil to catch rain. A third source of water is the metabolic water from the breakdown of stored fat over time.

Years of successive "drought" are not uncommon. Sometimes in a given year the rainfall completely misses part of the tortoise population because of localized showers that occur over the desert.

A wild tortoise will lose its water (void) when startled or picked up. Although the tortoise can withstand considerable dehydration, to replace this water requires additional rainfall and / or moist food. This may not be available. Therefore, it is important NOT to disturb a wild tortoise UNLESS it is in imminent, life-threatening danger.

Food

The tortoise has a horny beak for a mouth and no teeth. These herbivores – plant eaters - eat grasses, blossoms, and succulent cactus flesh. Their metabolism allows them to go months without eating and drinking. They derive almost all of their water from consuming plants. As the spring plants dry out, the tortoise will eat some of the drying shrubs/flowers and grasses. Tortoises will eat the plants that are readily available but they have foods that they prefer. As weeds become more widespread tortoises may lose native forage. This invasion may also lead to an increase in the frequency of fires as many non-native plants create dense patches of vegetation not normally found in a desert environment.

Food Chain / Predator/Prey

The tortoise is an important part of the desert food chain. As the Desert Tortoise is grazing contentedly, it is stalked by **predators** - such as the coyote, fox and raven. These animals **prey** on the tortoise, especially the small hatchling. The raven hunts for the vulnerable hatchlings and young tortoises with the soft shell that is easily pecked apart. The coyote will occasionally attack and eat parts of the extremities and clean out the inside of an unbroken shell. When small mammals such as rabbits and rodents are in short supply the tortoise becomes an even more in demand prey.

Human Physiology

Hypothermia occurs when the human body's control mechanisms fail to maintain a temperature between 98.9 F and 99.9 F. Once it drops to 95F or lower a body enters the first stages of hypothermia. How do we keep warm? By wearing the correct type of clothing, layering the clothing, and keeping as dry as possible. Signs to watch for are stumbling, mumbling, grumbling, fumbling – in other words the “umbles.” If one is cold and wet it is important to try to move indoors and get warm and dry early – before the encounter becomes serious.

Hyperthermia sets in when the person has an elevated body temperature. This descriptive term describes heat-related illnesses such as heat exhaustion or heat stroke. When a body temperature exceeds 100 F or above, it is classified as a fever. But, hyperthermia can also result from too much exercise without water or salt and temperatures can rise to 106 F. The person may be thirsty, weak, uncoordinated, nauseous, and sweating profusely. Although heat exhaustion often is caused by the body's loss of water and salt, salt supplements should only be taken with advice from a doctor.

Hyponatremia means a low concentration of sodium in the blood. The simplest explanation for this is when sweat (a mixture of salt and water) is replaced by ingested water (no salt). Excessive water can dilute the sodium in the bloodstream, and hyponatremia may result. Eating salty foods and hydrating with a sodium laced-sports drink can treat nausea and mild muscle cramps. Know what your body's needs are while exercising or exerting yourself.

Desert Animals vs. Humans A study was done in 1941 in Australia comparing a desert animal's water needs with a human's water needs. Sheep were exposed to temperatures of 105 degrees F over a three-day period without access to water. The sheep lost up to 20% of its weight. In the field they could lose up to 31 per cent of their weight. When allowed to drink the sheep quickly replenished its water drinking 7 to 9 liters at once. This is around 18 to 23 per cent of the dehydrated body weight and similar to the drinking capacity of the camel.

In humans, the need for water is set by the need for the human body to dissipate heat. Not only heat from hot surroundings but heat from its own production of metabolic heat. In the heat of the desert sun humans sweat and can lose up to 1.5 liters of moisture on average. Sweat contains a variable amount of sodium chloride. High sweating rates can lead to salt depletion.

If a human tries to store water by drinking a lot, the body naturally expels the excess through the kidneys. In a moderate climate if a large quantity of water is ingested it is usually absorbed within an hour and then eliminated in an hour or two. In the desert if a human ingests a liter of water and starts out to hike in hot weather they may sweat off the excess water and have very little urine volume.

Tortoises can go long periods of time without taking in water. However, tortoises cannot tolerate the consumption of salty foods or plants, as they do not have the compensating mechanisms, which mammals have to excrete excess sodium. Their urine can become very concentrated and potassium-laden. When the urine has become as concentrated as the tortoises' blood, the water will no longer pass from the bladder into the system. They are able to produce both uric-acid and urea, however.

The Future

Although it does not need as much acreage to survive, as do some of the larger animals found in the Mojave Desert, the desert tortoise is an umbrella species for the Mojave Ecosystem. Umbrella species have large home ranges (tortoises are spread throughout the Mojave Desert) and small population densities, and narrow habitat requirements. Protection of the habitat of the tortoise supposedly protects the habitat of many other species.

Most hatchlings do not survive to adulthood –ravens, snakes and other birds eat the vulnerable newborns. The continued encroachment of human development in the Las Vegas Valley threatens the remaining wild tortoises that are east of the Colorado River. It is a testament to the strength of the Desert Tortoise, defenseless except for its shell covering, that it does survive to adulthood.

One question to ask might be - If tortoises can't survive in such a harsh environmental, how will other species thrive? As scientists study the biodiversity of the desert they will learn more about the contributions of the tortoise to this complex biome.

Outline of Program

* Required in all programs

Today we are going to talk about the desert tortoise

5 minute – Introduction*

Introduce yourself and tell them the agency you represent. Explain a little about the habitat at Red Rock Canyon (Mojave Desert) and that it is the home of Mojave Max. Mojave represents all the tortoises that live in the wilds of Southern Nevada and he is important to our state.

5 minute – Conservation Message/Partnership with Clark County*

Discuss Mojave Max contest, give them the website address, and explain how Clark County is sponsoring the contest because we are trying to raise the awareness of the community about the dangers Mojave faces.

Choose from the following activities for the rest of your program. (20-30 minutes worth)

10-15 minutes – Description of Life Cycle

Mojave Max's life began when his mother used her hind legs to dig a hole (nest) in the ground and lay several eggs (1-14 eggs). Mojave Max's egg was approximately the size of a ping-pong ball (show ping-pong ball). Two to four months went by and Mojave grew and matured inside his egg. Finally, Mojave was ready to face the outside world. The size of a silver dollar, Mojave had to be careful since his shell is still soft (like a baby's head after birth) and his mother did not have a maternal instinct – she is long gone and can not protect him.

How can a tortoise fit inside of a small, round shell?

Show Pokey-Mon toy and explain how the hatchling folds into the shell. Because of the soft flexibility of the shell, it can grow and fit into a circular shape even though the shell begins to harden once the hatchling emerges.

Then discuss the dangers of having a soft-shell for first 5 years.

A soft-shelled tortoise makes a great lunch for ravens, coyotes, bobcats, and badgers. It is known in the tortoise world only one to five out of every 100 hatchlings will survive to be an adult. If it does make it, a tortoise may live to be 60 to 80 years old. Eventually, Max's soft shell hardens as more and more bone is formed underneath the scutes and his shell is a great defense against predators while outside his burrow.

10 minutes – Become a Tortoise Activity

Ask for a volunteer to come up and become the tortoise. Begin with the shell, or large aluminum pans, by placing the flat side in front. What is the advantage/disadvantage of a shell to the Desert Tortoise? Explain the shape, each of the three parts, number of large scutes on the carapace, the color of the shell, and the use of the horn. To distinguish between males and females you have to look at the plastron. Females will have flat plastrons and males will have a concave (or dished) shaped plastron. Next, place the custom gloves or "elephant feet" on the student. Ask the students how the tortoise's flat scales on the forelegs might serve the tortoise? What would the tortoise use the large nails for? Explain the different uses of the legs and nails, such as digging burrows or nests.

5 minutes – Anatomy discussion

The Desert Tortoise has a basic skeleton with an attached shell that covers its back and underside for protection. Show the tortoise skeleton to the class

and discuss the legs, scutes, nails, etc. Did you know each tortoise has a unique growth rate and ring pattern? It is similar to the uniqueness of fingerprints of humans. Scientists use both straight line and curved methods of measuring scutes for determining age.

10 minutes – Biome discussion

Discuss the weather in the Desert that influences this particular Biome.

Then have students compare their personal needs for survival in this desert city – food, water, shelter - to the needs of the tortoise in its desert habitat.

How would you find and fill your needs in the desert? Contrast briefly with city life and compare to Desert Tortoise life.

The undisturbed desert habitats around the Las Vegas Valley reflect the natural desert biome with its related plants and animals adapted to living in such a harsh environment.

Within this desert **biome** the Desert Tortoise selects certain parts of the desert to live in for survival. They have a better chance of survival in a particular habitat. They seek areas of the desert with soil suited for digging, they love flowers and cacti and the fruit produced each year by these plants. The plants provide food as well as water to the Tortoise.

Tortoises seem to have a good sense of direction and use local landmarks to find drinking sites, mineral licks, and food sources. Why would it be important to a tortoise for it to remember where these things are?

The home range for a given tortoise may range between 2.6 acres for a juvenile and to over a square mile for an adult. They require this to meet their needs for food, protection, and reproduction. In most places the juveniles have the smallest home ranges and those of males are larger than females.

10 minutes – Thermometer/Temperature Comparisons

Explain the tortoise can function between the temperatures of approximately 68 degrees and the upper 90's. Unlike humans, they are not able to elevate their bodies up off the hot desert floor. Humans have only the feet touching but tortoises have their whole lower body close to a very hot surface.

Hold up the large laminated thermometers and discuss with the students the different temperatures represented.

One thermometer will indicate 40 degrees and one will indicate about 100 degrees. What would the tortoise be doing at a consistent temperature of 40 degrees in December (brumation) and what would they most likely be doing at a consistent temperature of 100 degrees or more in July (aestivation)? What about a temperature that was about 70 degrees (very sluggish), 85 degrees (most active), and what about 95 degrees (beginning to overheat – where's the shade)? If the tortoise, due to absence of shade or not locating a burrow, gets too hot they can panic and speed up, moving quickly. Then they could die from overheating.

10 minutes - Human vs. Animal Physiology

As humans what happens to us when we get too hot – (Hyperthermia or heat stroke) or too cold (Hypothermia) or drink too much water at once (Hyponatremia)? Discuss - How much fluid can a person/bighorn sheep/tortoise lose before they are adversely affected? How much can they take in before overloading?

5 minutes - Hibernation vs. Brumation

Discuss the differences between the two adaptations. Mammal vs. reptile, deep sleep vs. partially awake state. Any similarities - internal clocks, metabolism, shelter from elements.

10 minutes - Land use planning issues

Tortoise preservation can be accomplished by the use of science measures such as surveys, data collection and monitoring, observation and wildlife management. Sometimes political pressure or concern about the well being of our planet forces policymakers to act without all the scientific facts.

If you were working for the Federal Agency charged with setting policy on desert tortoises what kind of evidence would convince you that the tortoise population were declining.

15 minutes - Jeopardy

Set these questions up in categories and have each group of 5+ students try to answer the questions together. Then all groups will come together and compare answers – each question is worth points. The group with the most points wins “Jeopardy.”

Answers

Body

The Tortoise digs its burrow with these.
These large plates cover the carapace.
This is used to flip over other males.
The underneath portion of the tortoise shell.
The protective shell covering the living tissue of a tortoise back.

Life History

60 to 80 years.
This describes a tortoise shell for the first five years.
Season Mojave Max will emerge from brumation.
Tortoise eggs hatch late in this season.
Sleep state reptile enters during hottest parts of season.

Places

The state reptile of Nevada.
The desert we share with this tortoise.
The amount of time a tortoise spends below ground.
In summer time of day a tortoise found above ground.
The place the wild tortoise is the most protected

Miscellaneous

Classification of animal discussed today that does not have an internal body temperature control.
The name of a baby tortoise.
The legal status of the Desert Tortoise.
Animals that eat plants exclusively.
What you do when you encounter a wild tortoise.

Questions

What is/are

Nails/front legs 100
Scutes 200
Gular horn 300
Plastron 400
Carapace 500

Life span of Tortoise 100
Soft 200
Spring 300
Summer 400
Aestivation 500

Desert Tortoise 100
Mojave Desert 200
98 % of its life 300
Dawn /dusk 400
Burrows 500

Reptile 100
Hatchling 200
Threatened 300
Herbivores 400
Leave it alone 500

2 minutes (Optional for High School Students)

Tortoise Pledge

At the end of the program distribute pledge cards and if you think the students are receptive have the students recite the tortoise pledge. They are now official tortoise patrol members.

5 minutes

Conclusion*

Summarize adaptations and why brumation is so important to Mojave Max.
Also, what can the student do to protect the habitat of the desert tortoise.
Tread lightly, and stay on approved roads.

What would they do if they saw a tortoise in the wild? LEAVE IT ALONE. If it is injured or in the middle of a busy highway, stop safely, approaching from the front - move the tortoise gently several steps to the side of the road facing the direction it is heading and if possible place it under a shrub/shade – keeping the plastron level to the ground.

What would they do if they see one in the city? DON'T RETURN IT TO THE WILD. Collect it safely, take it home, put it indoors in a cool place and immediately call the Tortoise Pick-up Service, 593-9027. The tortoise must be turned in by law. Do not release it in the desert, give it away, or keep it.

Pre-site activity

1. Desert Adaptation from “Desert Tortoise Study Kit and Curriculum” Unit one, page 30. Grades 3-6.
2. Adaptation Match from “Desert Tortoise Study Kit and Curriculum” Unit one, page 33. Grades 4-6
3. Desert Web of Life from “Desert Tortoise Study Kit and Curriculum” Unit two, page 27. Grades 6-8.

Post-site activity

1. Hand out tortoise word search. Grades 1-6
2. Desert Tortoise Folk Tales from “Desert Tortoise Study Kit and Curriculum” Unit three, page 8. Grades 4-6.
3. Tortoise Ranges from “Desert Tortoise Study Kit and Curriculum” Unit two, page 18. Grades 7-12.
4. The student will develop a food chain and identify the trophic levels (ecological pyramid) of the organisms therein.

More Ideas

Check out our website www.mojavemax.com

Tortoise Adoption – call 739-7113

Tortoise Group (Developing a Habitat) 739-8043

Use school website to display tortoise projects, stories, pictures

Some Schools with Desert Tortoise Habitats

Martha P. King Elementary – Boulder City, Nevada

Booker Elementary

Attachment A

Mojave Max Secondary Curriculum

6th Grade Life Science:

- 1.2 The student will differentiate between fact and opinion.
- 1.14 The student will measure temperature using the Celsius scale.
- 2.4 The student will recognize that living things have unique life cycles.
- 3.1 The student will compare the parts of an ecosystem, including non-living parts.
- 3.2 The student will describe various cycles in an ecosystem.
- 3.3 The student will discuss the interactions among producers, consumers, and decomposers.
- 3.5 The student will combine food chains to show a more complex food web.
- 3.6 The student will predict the effects an event will have in an ecosystem.
- 3.7 The student will understand that when decisions about the environment are made, some parts of the environment will be helped and others will be harmed.
- 3.8 The student will analyze how humans interact with the environment.
- 3.11 The student will describe the characteristics of major biomes.
- 4.1 The student will describe the characteristics of animals.
- 4.2 The student will describe how the characteristics of an animal help it survive in its environment
- 12.11 The student will recognize that different species live where they can best survive and reproduce

7th Grade Earth Science:

- 1.1 The student will differentiate between observations and inferences.
- 5.5 The student will identify the factors that determine climate.
- 5.6 The student will illustrate the major climate zones of the earth.

High School Biology

- 2.1 The student will describe the characteristics of major terrestrial and aquatic biomes.
- 2.2 The student will describe the characteristics exhibited by various organisms that adapt them for their particular habitat.
- 2.3.1 The student will develop a food chain and identify the trophic levels (ecological pyramid) of the organisms therein.
- 2.4 The student will depict interrelationships of organisms in a food web.
- 2.8 The student will relate how various limiting factors affect the population growth and carrying capacity.

High School Environmental Science

- 3.1 The student will distinguish between biotic and abiotic factors in the environment.
- 3.2 The student will distinguish the trophic levels of living organism. The student will outline the components of an ecosystem.
- 3.4 The student will examine how interactions between a species and its environment define the species' niche.
- 3.8 The student will examine predatory-prey relationships.
- 4.1 The student will describe one of the major biomes of the earth.
- 4.2 The student will describe major organisms of each biome.
- 4.4 The student will explain the need for wildlife management.
- 12.1 The student will describe land use patterns in the Las Vegas Valley.

**Mojave Max
Body of Knowledge Quiz**

Explain why the Federal Agencies and Clark County are sponsoring this program?

Describe three weather conditions found in the Mojave Desert.

- 1.
- 2.
- 3.

Name at least four parts of a tortoise shell.

- 1.
- 2.
- 3.
- 4.

List the temperature range for a tortoise to survive comfortably above ground.

Describe the lifecycle of a Desert Tortoise.

What are the scientific terms for winter sleep and summer sleep?

What are three factors that cause the Desert Tortoise to emerge in the Spring?

- 1.
- 2.
- 3.

Name two biological and two behavioral adaptations of the desert tortoise.

- | | |
|----|----|
| 1. | 1. |
| 2. | 2. |

Name three threats to the desert tortoise.

- 1.
- 2.
- 3.

Explain the different actions to take when discovering a captive tortoise on a city street vs. discovering a wild tortoise in the desert?

Mojave Max ANSWERS
Body of Knowledge Quiz

Explain why the Federal Agencies and Clark County are sponsoring this program?

Because the desert tortoise is a threatened species that needs protection and a students actions present and future will affect the lifestyle of the tortoise.

Describe three weather conditions found in the Mojave Desert.

1. little rainfall
2. intense sunlight or extreme temperature range or rain shadow desert
3. windy and dry

Name at least four parts of a tortoise shell.

- | | |
|---------------|-------------|
| 1. carapace | 2. plastron |
| 3. gular horn | 4. scutes |

What is the most “comfortable” body temperature for a desert tortoise?

85 degrees to 95 degrees

Describe the lifecycle of a Desert Tortoise.

Females lay eggs in the spring and 80-120 days later the hatchling emerges in late summer. The first five years are soft shelled, when a juvenile (equivalent to teenager) it begins to sexually mature and reproduce. Survive to about 60 in wild, 80 in captivity.

What are the scientific terms for winter sleep and summer sleep?

Brumation and Aestivation

What are three factors that cause the Desert Tortoise to emerge in the Spring?

1. Lengthening of light of day
2. Internal Clock - Instinct
3. Temperature

Name two biological and two behavioral adaptations of the desert tortoise.

- | | |
|----------------------|--|
| 1. nails for digging | 2. can go without water for extended periods |
| 1. brumation | 2. aestivation |

Name three threats to the desert tortoise.

1. Predators like coyote, ravens / Trash /
2. Development of Las Vegas Valley / Loss of Habitat
3. Off-road travel in undeveloped areas of Mojave Desert / Taking tortoise home

Explain the different actions to take when discovering a captive tortoise on a city street vs. discovering a wild tortoise in the desert?

Captive – look around neighborhood for owner or call tortoise adoption hotline, do not return to wild.

Wild – leave it alone – only if in danger move it to side of road to a shady area

